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EXAMINER	
GEBRESILASSIE, KIBROM K	

ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
06/04/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/538,763	SLONAKER, STEVEN DOUGLAS	
	Examiner	Art Unit	
	KIBROM GEBRESILASSIE	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 10 May 2010.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-48 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 16-20 and 30-41 is/are allowed.

6)☒ Claim(s) 1-15,21-29 and 42-48 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is responsive to RCE filed on 05/10/2010.

2. Claims 1-48 are pending in this application. Claims 1, 15, 16, 42, 46 and 47 have been amended. Claims 16-20 were objected for being dependent on rejected Independent claim 1. Currently, Claim 16-20 are allowed because claim 16 is re-written in independent form. Claim 30-41 are allowed. Claims 1-48 are pending in this application.

Response to Arguments

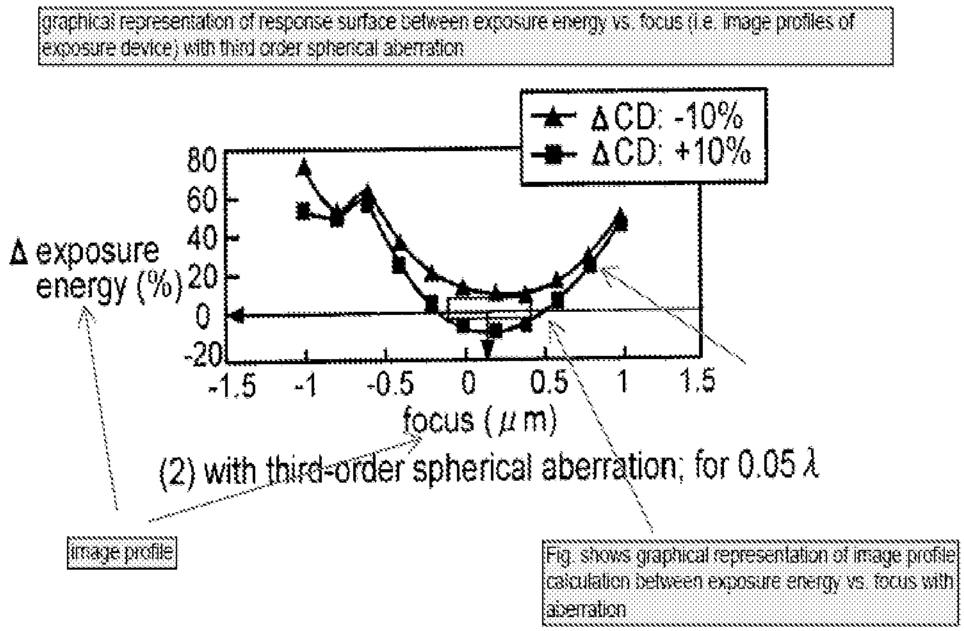
3. Applicant's argument relating to 102 art rejection is not persuasive.

a. Applicant argued that Miwa et al fails to disclose response function are based on a value of an aberration component as recited in claim 1.

Examiner respectfully disagrees. In light of applicant specification, Fig. 5 shows set of data sample points are forming response surface functional relations between exposure energy and focus with third order spherical aberration. The exposure energy vs. focus is varied to produce enough set of data points to form a response surface. The response surface is based on a specified aberration of 0.05 and is therefore disclosed.

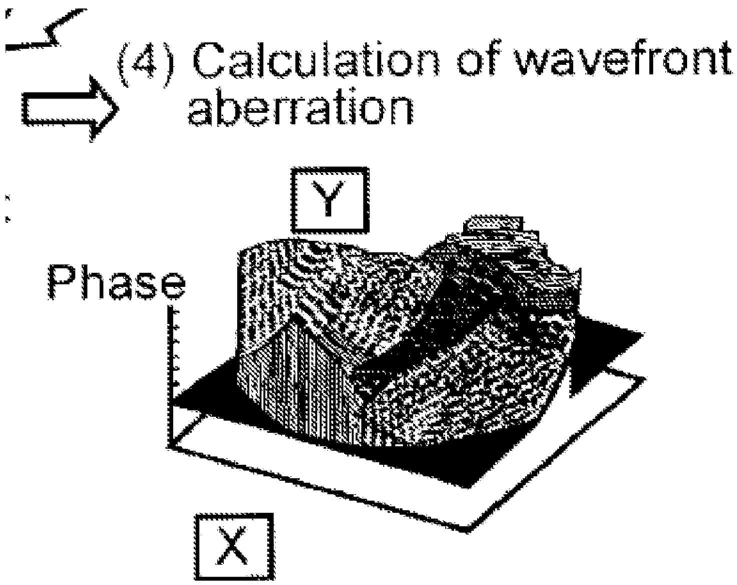
b. Applicant argued that Miwa et al fails to disclose calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations, as further recited in claim 1.

Examiner respectfully disagrees. Fig. 5 clearly reads the recited claimed feature as follows:



The set of data sample points are representing the calculation between exposure energy vs. focus offset (i.e. image profiles) within a range of (+/-) 10 with specified aberration (i.e. 0.05) in conjunction with the response. Therefore, it would have been easier to read the result of the image profile based on exposure energy vs. focus offset by looking the above graphical representation of data points of response surface relations between exposure energy vs. focus offset of (+/-) 10 and specific aberration of 0.05.

Further, the figure shown below also represents three dimensional response surface relations between X, Y and aberration. X, and Y might represent one of the image profiles as user choice.



c. Applicants argued that Miwa et al fails to disclose the feature of claim 15.

Examiner respectfully disagrees. Miwa et al discloses performing a full simulation calculation (such as "the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 simulation calculation with aberration).

The limitation of "calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile" is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure.

4. Applicant's argument relating to 103 art rejection is not persuasive.

d. Applicants argued that no proper combination of the applied art teaches or suggests each and every features of the claimed invention.

Examiner respectfully disagrees. As stated in pervious office action, Miwa et al does not expressly disclose fitted coefficients values using the response surface functional relations.

Seltmann et al discloses fitted coefficients values using the response surface functional relations (such as “calculate a fit function E(x) by linear regression, least square fit or any higher order fit”; See :Col. 4 lines 18-24).

It would have been obvious to one of ordinary skill in the art to combine the teaching of Seltmann et al with the teaching of Miwa et al because both references are drawn to lithography for semiconductor manufacturing. The motivation to include the fitting function of Seltmann et al to the exposure system of Miwa et al would be to compensate for exposure system error to reduce CD distribution (See: Seltmann et al).

e. As per Claims 42-45, the same response to argument as claim 1 will apply.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites “the calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile”. It is unclear how this is done. What does it mean by “full simulation”? How does the decision made whether to perform a full simulation or not? Further, the claimed invention indicates “performing a full simulation" then indicated not to perform "full simulation", which it contradict to each other.

In any case, the limitation is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure.

Claim Interpretation

7. As per Claim 15, the limitation of “calculating the image profile is performed without performing a full simulation calculation each and every time new specified aberration values are provided and presented for calculation of a new image profile" is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

9. Claims 1-6, 9-13, 15, 21-27, and 46-48 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6, 653, 032 issued to Miwa et al.

f. As per Claim 1, Miwa et al discloses a method of calculating estimated image profiles implemented on a tangibly-embodied storage medium resident on one or more computing devices, comprising the steps of:

providing imaging configuration characteristic data (such as “aberration information, process specification information"; See: Col. 4 lines 1-23);

performing simulation calculations for various levels for each aberration component using the imaging configuration characteristic data using a processor of the one or more computing devices (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 simulation calculation with aberration);

building response surface functional relations using the processor of the one or more computing devices between variables of lens characteristics and an image profile of interest using the simulation calculations (such as "difference between the exposure devices, such as differences in the aberration of the projection lenses, so that the response surface function have to be produced and corrected for each exposure devices"; (See: Col. 3 lines 19-23), Fig. 5 also shows the response surface function of exposure energy and the focus offset due to different aberration of the projection lenses"), wherein the response surface functional relations are based on a value of an aberration component

(See: Fig. 5 shows the response surface functional relation between exposure energy and the focus offset due to a third order spherical aberration).

calculating an image profile using specified aberration values of a lens in conjunction with the response surface functional relations using the processor of the one or more computing devices (Fig. 5 shows the set of data sample points are representing the calculation between exposure energy vs. focus offset (i.e. image profiles) within a range of (+/-) 10 with specified aberration (i.e. 0.05) in conjunction with the response).

g. As per Claim 2, Miwa et al discloses the method of claim 1, wherein the image profiles which result as part of the evaluating step are used as measures of relative lens adjustment goodness in an iterative lens adjustment optimization routine (such as "the fluctuation of the exposure energy and the focus offset due to different aberration, the exposure device has to be corrected with aberration 0.05, by an offset of 0.2"; See: Col. 6 lines 60-67).

h. As per Claim 3, Miwa et al discloses the method of claim 1, wherein the imaging configuration characteristic data includes lens data, illumination data and pattern data (See: Fig. 5 the exposure energy and focus offset data's).

i. As per Claim 4, Miwa et al discloses the method of claim 3, wherein:
the illumination data includes at least one of illumination distribution and illumination wavelength, the lens data includes at least one of lens aberration, numerical aperture, pupil filters and lens configuration; and the pattern data

includes object (reticle pattern) layout (such as "process specification database"; See: Col. 6 lines 6-21).

j. As per Claim 5, Miwa et al discloses the method of claim 4, wherein the imaging configuration characteristic data further includes at least one of pattern bias characteristic information and lens focus (such as "process specification database"; See: Col. 6 lines 6-21).

k. As per Claim 6, Miwa et al discloses the method of claim 1, wherein the simulation calculations are executed for various levels of each aberration component (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

l. As per Claim 9, Miwa et al discloses the method of claim 1, wherein the response surface functional relations correspond to a sample set of lens characteristics with a final output from application of response surface functional relations being an image profile under the influence of lens aberrations (See: Fig.5, graphical representation of response surface between exposure energy vs. focus offset of (+/-) of 10 with specified aberration of 0.05).

m. As per Claim 10, Miwa et al discloses the method of claim 9, wherein the data configuration characteristic information includes lens characteristics related to variation in single aberration values alone or in combination with one another or with selected items from among the lens characteristics (such as “the exposure energy and the focus offset due to different aberration of the projection

lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

n. As per Claim 11, Miwa et al discloses the method of claim 1, wherein the response surface functional relations are related to a look-up table summarizing the results of interpolating the image profile generated by the simulation calculations of the performing step (such as “calculation results for the exposure device, reticle, exposure energy and focus offset"; See: Col. 10 lines 19-22, Fig. 9).

o. As per Claim 12, Miwa et al discloses the method of claim 11, wherein the look-up table is direct simulation image profile results or of functional coefficients used to calculate the image profile (such as “calculation results for the exposure device, reticle, exposure energy and focus offset"; See: Col. 10 lines 19-22, Fig. 9).

p. As per Claim 13, Miwa et al discloses the method of claim 11, wherein the evaluating step includes determining image profile data points using the look-up table to provide a new image profile associated with specified aberration values (such as “calculation results for the exposure device, reticle, exposure energy and focus offset of steps 207 and 208 of Fig. 8"; See: Col. 10 lines 19-22, Fig. 9).

q. As per Claim 15, Miwa et al discloses the method of claim 1, wherein the performing simulation calculations for various levels for each aberration component comprises performing a full simulation calculation and the calculating the image profile is performed without performing a full simulation calculation

each and every time new specified aberration values are provided and presented for calculation of a new image profile (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

r. As per Claimed 16-20, Allowed.

s. As per Claim 21, Miwa et al discloses the method of claim 1, wherein each different aberration value applied during the performing step leads to one full image simulation calculation (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

t. As per Claim 22, Miwa et al discloses the method of claim 1, wherein the evaluating step provides one output image profile for each one set of specified input aberration values (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

u. As per Claim 23, Miwa et al discloses the method of claim 1, wherein the response surface function relations are built relating any of variables: (i) position within a specified image plane, (ii) intensity or amplitude, (iii) focus, and (iv) all component aberration levels (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

v. As per Claim 24, Miwa et al discloses the method of claim 1, wherein the performing step includes the steps of:

defining a simulation pixel as a unit of horizontal or vertical, position into which an aerial image is divided (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).;

calculating aerial image amplitude or intensity on each simulation pixel (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).; and

executing the calculations at defocus positions to provide image profile data including focus response (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

w. As per Claim 25, Miwa et al discloses the method of claim 1, wherein the evaluating step includes summing an impact from all specified aberration values or combinations of values defined as aberration coefficients for image profile reconstruction (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

x. As per Claim 26, Miwa et al discloses the method of claim 25, wherein the summing step provides an output of intensity or amplitude vs. at least one of

position and focus for the specified aberration values which are an arbitrary set of aberration values (See: Fig. 5 exposure energy vs. focus offset).

y. As per Claim 27, Miwa et al discloses the method of claim 1, wherein the evaluating step is performed using a linear equation using fixed functions with coefficients determined in the building step (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration).

z. As per Claim 30-41, allowed.

aa. As per Claims 46-48, the instant claim(s) recite(s) substantially same limitation as the above rejected claim(s) 1-2, and therefore rejected under the same rationale.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 7, 8, 14, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6, 653, 032 issued to Miwa et al as applied to claims above, and further in view of US Patent No. 6, 493, 063 issued to Seltmann et al.

a. As per Claim 7, Miwa et al discloses producing a response surface function (See: Col. 2 lines 51-56).

However, Miwa et al does not expressly disclose fitted coefficients values using the response surface functional relations.

Seltmann et al discloses fitted coefficients values using the response surface functional relations (such as "calculate a fit function E(x) by linear regression, least square fit or any higher order fit"; See :Col. 4 lines 18-24).

It would have been obvious to one of ordinary skill in the art to combine the teaching of Seltmann et al with the teaching of Miwa et al because both references are drawn to lithography for semiconductor manufacturing. The motivation to include the fitting function of Seltmann et al to the exposure system of Miwa et al would be to compensate for exposure system error to reduce CD distribution (See: Seltmann et al).

b. As per Claim 8, Seltmann et al discloses the method of claim 1, further comprising the step of generating a new set of aberration components impact upon image profile coefficient values using interpolative methods using the response surface functional relations using the processor of the one or more computing devices (such as "calculate a fit function E(x) by linear regression,

least square fit or any higher order fit”; See : Col. 4 lines 18-24; also “fit curve of Fig 4).

c. As per Claim 14, Seltmann et al discloses the method of claim 1, wherein the evaluating step includes applying interpolated data of the built response surface functional relations to calculate the image profile for specified aberration values (See: Fit curve of Fig. 4).

d. As per Claim 27, Seltmann et al discloses the method of claim 1, wherein the evaluating step is performed using a linear equation using fixed functions with coefficients determined in the building step (“linear regression”; see: col. 4 lines 18-24).

e. As per Claim 28, Seltmann et al discloses the method of claim 1, wherein the building and evaluating steps are performed using a sinusoidal fitting function (See: Fit curve of Fig. 4).

f. As per Claim 29, Seltmann et al does not expressly disclose applying a Fourier Transformation or Fast Fourier Transform algorithm intended to estimate a Fourier Transformation process. However, Seltmann discloses a linear regression analysis which is inherently includes Fourier transformation process because a Fourier technique is a form of multiple regression analysis.

12. Claims 42-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6, 653, 032 issued to Miwa et al in view of US Patent No. 5, 528, 118 issued to Lee et al.

a. As per Claim 42, Miwa et al discloses an exposure apparatus, comprising:

an illumination system that projects radiant energy through a mask pattern on a reticle R that is supported by and scanned using a wafer positioning stage (See: Fig. 3 optical projection system, reticle, lense, wafer and wafer stage);

a system for providing optimal image profiling (such as “exposure energy vs. focus offset (i.e. image profiles)”), including:

means for providing image configuration characteristic data (such as “aberration information, process specification information"; See: Col. 4 lines 1-23);

means for performing simulation calculations for various levels for each aberration component using the image configuration characteristic data (such as “the exposure energy and the focus offset due to different aberration of the projection lenses as simulated with an optical development simulator"; See: Col. 6 lines 60-67, Fig. 5 with aberration);

means for building response surface functional relations between variables of lens characteristics associated with the image configuration characteristic data using the simulation calculations (such as "difference between the exposure devices, such as differences in the aberration of the projection lenses, so that the response surface function have to be produced and corrected for each exposure devices"; (See: Col. 3 lines 19-23), wherein the response surface functional relations are based on a value of an aberration component (See: Fig. 5 shows the response surface functional relation between exposure energy and the focus offset due to a third order spherical aberration); and

means for calculating image profile estimates for specified aberration values of a lens by evaluating the specified aberration values in relation to the response surface functional relations (Fig. 5 shows the set of data sample points are representing the calculation between exposure energy vs. focus offset (i.e. image profiles) within a range of (+/-) 10 with specified aberration (i.e. 0.05) in conjunction with the response).

Miwa et al discloses wafer stage (See: Fig. 3). Miwa et al fails to disclose at least one linear motor that positions the wafer positioning stage.

Lee et al discloses at least one linear motor that positions the wafer positioning stage (such as "a linear motor for aligning the wafer with the lens of the optical system"; See: Col. 3 lines 53-56).

It would have been obvious to one of ordinary skill in the art to combine the teaching of Lee et al with the teaching of Miwa et al because both references are drawn to lithography system. The motivation to include a linear motor of Lee et al with the system of Miwa et al would be to move and align the object stage in a given direction (See: Lee et al).

g. As per Claim 43, Miwa et al discloses the apparatus of claim 42, further comprising means for applying the aberrated image profile estimates in an optimization calculation method which judges image profile information against defined criteria as part of a lens adjustment optimization calculation (such as “calculating the optimum values of the exposure energy and focus offset using the process window for the exposure step”; See: Col. 2 lines 24-26).

h. As per Claim 44, Miwa et al discloses a device manufactured with the exposure apparatus of claim 42 (such as “fabricating semiconductor devices”; See: Col. 1 lines 24-25).

i. As per Claim 45, Miwa et al discloses a wafer on which an image has been formed by the exposure apparatus of claim 42 (“Wafer Stage”; See: Fig. 4).

Allowable Subject Matter

13. Claims 16-20 and 30-41 are allowed over a prior art.

14. The following is a statement of reasons for the indication of allowable subject matter: claims 16-20 and 30-41 are considered allowable since reading the claims in light of the specification, none of the references of record alone or in combination disclose or suggest the combination of limitations specified in the independent claims, specifically:

As per Claim 16, the limitation of “wherein the building steps include: providing a fitting function expressed as:

$$I_{spx}(x) = b_0 + b_1 x + b_2 x^2 + b_3 x^3 + \ldots + b_n x^n$$

where I_{spx} is aerial image intensity or amplitude at a simulation pixel *(spx)* and x indicates defocus; and

expressing a change of the coefficients $b_0 \ldots b_n$ described by an order fitting function expressed as:

$$b_{i(with\_aberration)} = b_{i(w/o\_aberration)} + \sum_{j=2}^{Zn} \Delta b_i(cj)$$

$$= b_{i(w/o\_aberration)} + \sum_{j=2}^{Zn} \varphi_{0(i,j)} + \varphi_{1(i,j)} c_j + \varphi_{2(i,j)} c_j^{\ 2} + \varphi_{3(i,j)} c_j^{\ 3} + \ldots + \varphi_{n(i,j)} c_j^{\ n}$$

wherein

$i = 0, 1, 2, 3, \ldots, n;$

$b_{i(with\ aberration)}$ and $b_{i(w/o\ aberration)}$ represents one of the coefficients $b_0 \ldots b_n$ influenced by lens aberrations and the coefficients $b_0 \ldots b_n$ without aberrations, respectively, and

Δbi indicates the change in coefficients and is expressed by an n^{th} order fitting function of *j*th Zernike coefficient c_j.

$\cancel{\Theta_{0(ij)} \cdots \Theta_{n(ij)}}$ $\underline{\varphi_{0(i,j)} \ldots \varphi_{n(i,j)}}$ are the coefficients of the fitting function, determined following the performing step of setup simulations of image profile as a function of regularly iterated values of lens aberration. ".

(as defined in specification page 34 line 15 through page 37 line 23).

As per Claim 30, the limitation of: "building response surface functional relations between variables of the image configuration characteristics and the image profile of interest using the simulation calculations data input to be fit using:

$$I_{spx}(x) = b_0 + b_1 x + b_2 x^2 + b_3 x^3 + ... + b_n x^n$$

where I_{spx} is aerial image intensity or amplitude at a simulation pixel *(spx)* and x indicates defocus; and

expressing a change of the coefficients $b_0 \ldots b_n$ described by an order fitting function expressed as:

$$b_{i(with\_aberration)} = b_{i(w/o\_aberration)} + \sum_{j=2}^{Zn} \Delta b_i(cj)$$

$$= b_{i(w/o\_aberration)} + \sum_{j=2}^{Zn} \varphi_{0(i,j)} + \varphi_{1(i,j)} c_j + \varphi_{2(i,j)} c_j^2 + \varphi_{3(i,j)} c_j^3 + ... + \varphi_{n(i,j)} c_j^n$$

wherein

$i = 0, 1, 2, 3, ..., n;$

$b_{i(with\ aberration)}$ and $b_{i(w/o\ aberration)}$ represents one of the coefficients $b_0 \ldots b_n$ influenced by lens aberrations and the coefficients $b_0 \ldots b_n$ without aberrations, respectively, and

Δbi indicates the change in coefficients and is expressed by an n^{th} order fitting function of *j*th Zernike coefficient c_j,

$\cancel{\theta_{0(ij)} \ldots \theta_{n(ij)}}$ $\underline{\varphi}_{0(i,j)}$ ..... $\underline{\varphi}_{n(i,j)}$ are the coefficients of the fitting function, determined following the performing step of setup simulations of image profile as a function of regularly iterated values of lens aberration." (as defined in specification page 34 line 15 through page 37 line 23).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KIBROM GEBRESILASSIE whose telephone number is (571)272-8571. The examiner can normally be reached on Monday-Friday 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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